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Nagata et al.

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(54) **DOOR OUTER HANDLE APPARATUS FOR VEHICLE**

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(58) **Field of Classification Search**
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See application file for complete search history.

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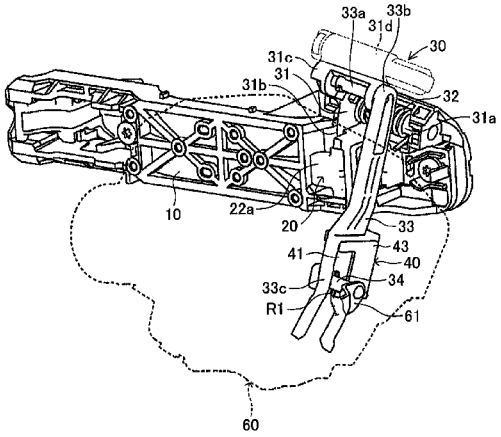
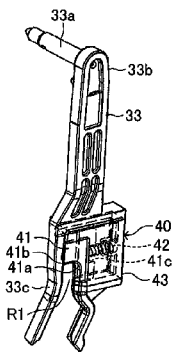
(57) **ABSTRACT**

A door-opened-prevention mechanism comprises a lever member, and a biasing member biasing the lever member toward a set position. The lever member is assembled to a connection lever. The lever member is movable between the set position and a fallback position which is in a vehicle outer direction to the set position. When an inertia force, exerted on an outer handle toward the vehicle outer direction at the time of vehicle impact, is not exerted on the outer handle, the lever member is kept in the set position to enable a necessary and sufficient movement of the connection lever in a direction for opening a door, and when the inertia force is exerted on the outer handle, the lever member moves to the fallback position prior to movement of the outer handle for opening the door so as not to enable the necessary and sufficient movement of the connection lever.

9 Claims, 7 Drawing Sheets





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E05B 77/06 (2014.01)
E05B 85/16 (2014.01)

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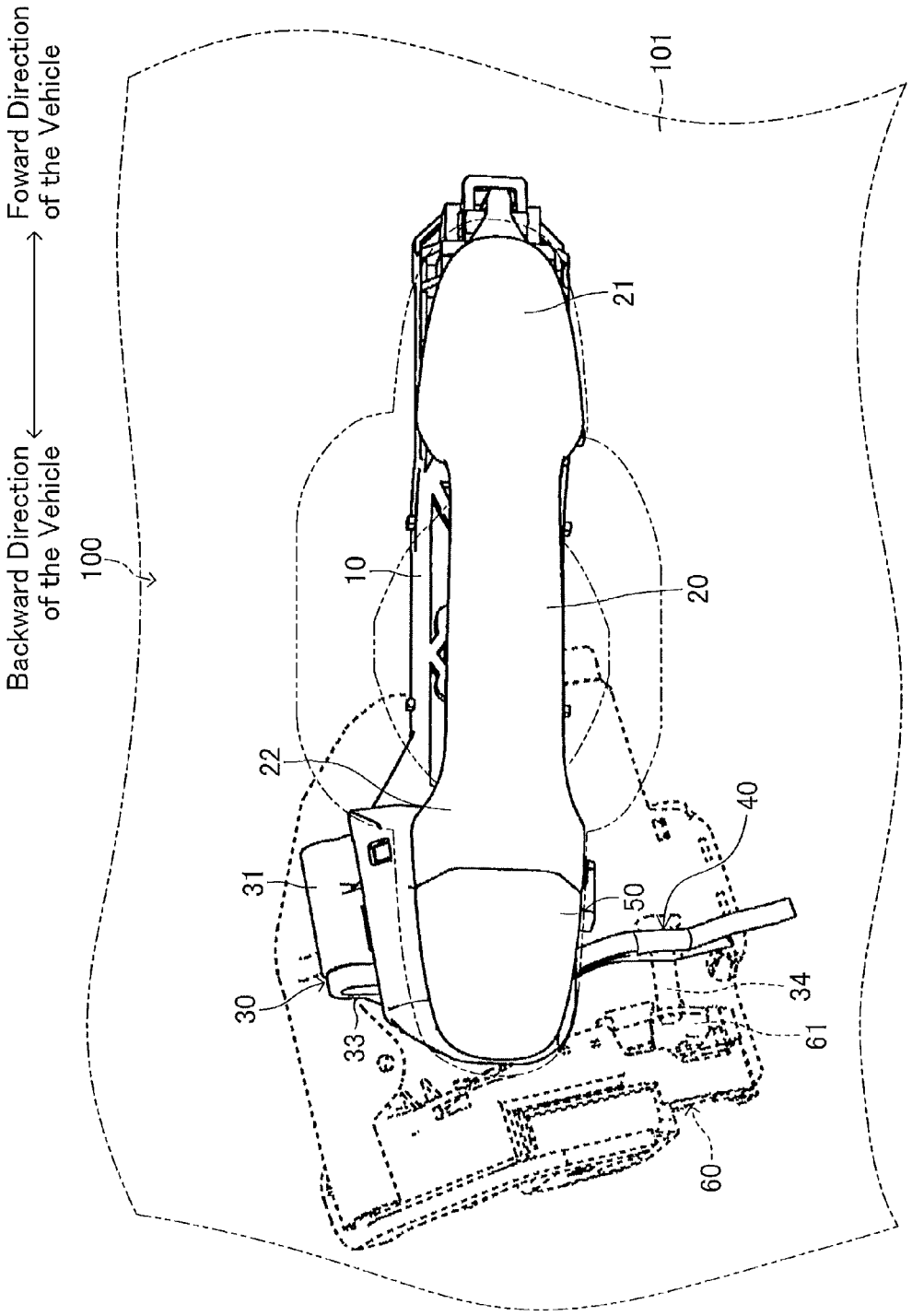

Foward Direction of the Vehicle
Backward Direction of the Vehicle
100
101
10
20
21
22
30
31
33
34
40
50
60
61

FIG.1

FIG.2

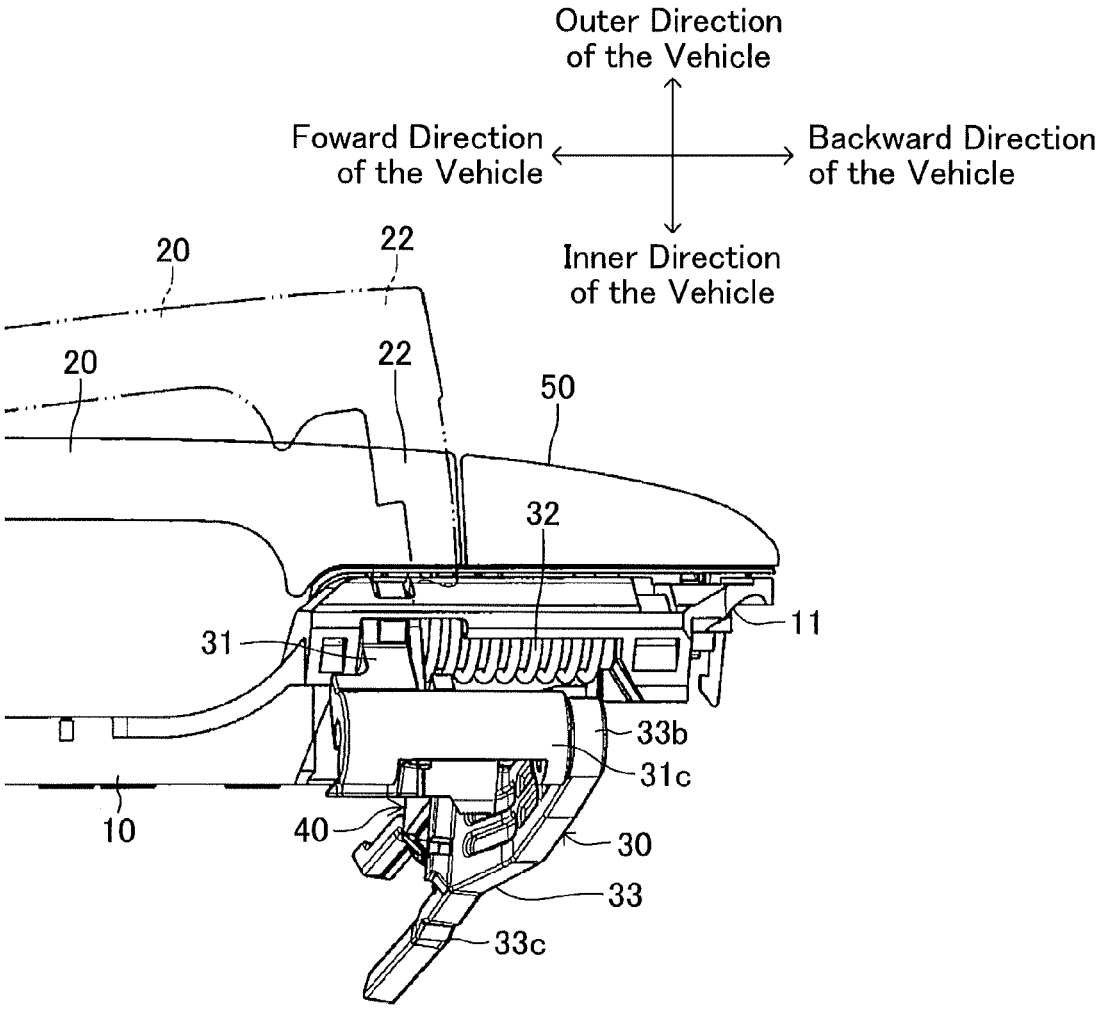

Outer Direction of the Vehicle
Foward Direction of the Vehicle
Backward Direction of the Vehicle
Inner Direction of the Vehicle
20
22
20
22
50
32
31
11
33b
31c
10
40
30
33
33c

FIG.3

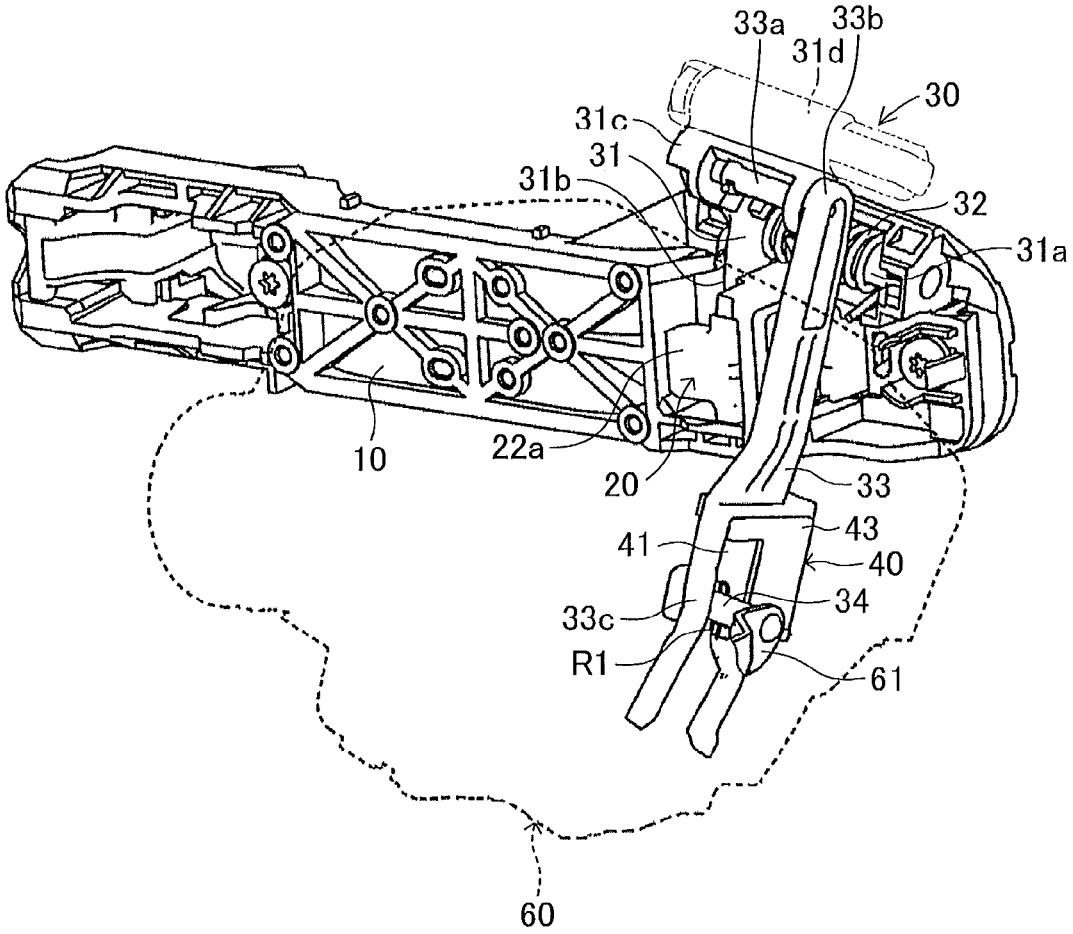

33a
33b
31d
30
31c
31
31b
32
31a
10
22a
20
33
43
41
40
34
33c
R1
61
60

FIG.4

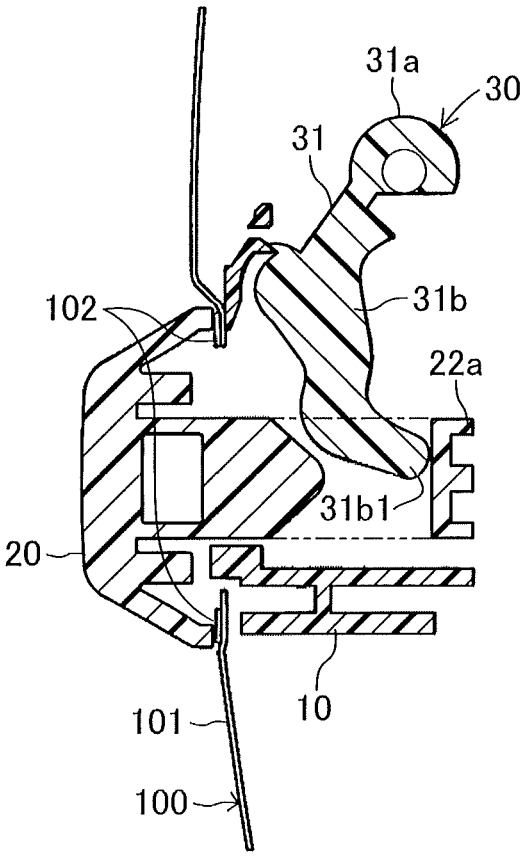


FIG.5

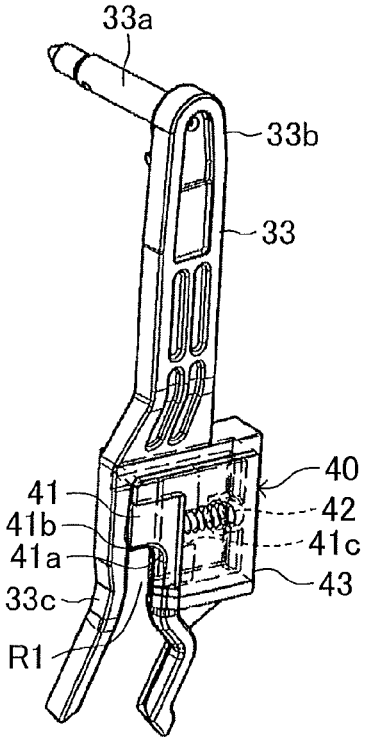

33a
33b
33
40
41
42
41b
41c
41a
43
33c
R1

FIG.6

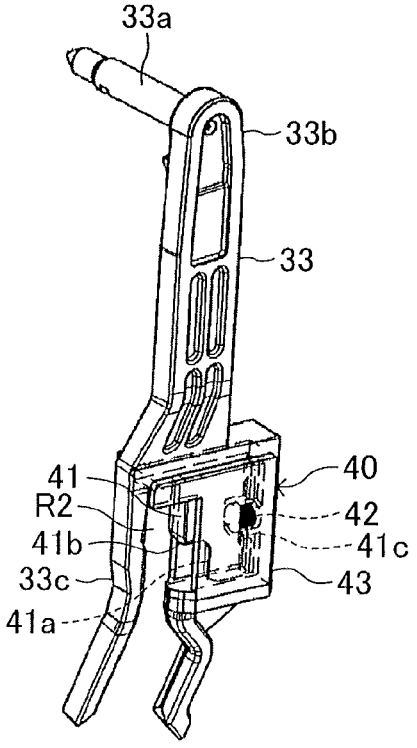

33a
33b
33
41
40
R2
42
41b
41c
33c
43
41a

FIG.7

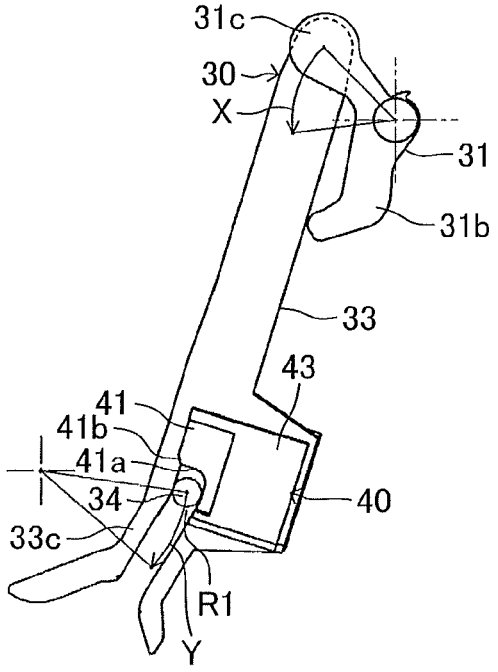

31c
30
X
31
31b
33
43
41
41b
41a
34
40
33c
R1
Y

FIG.8

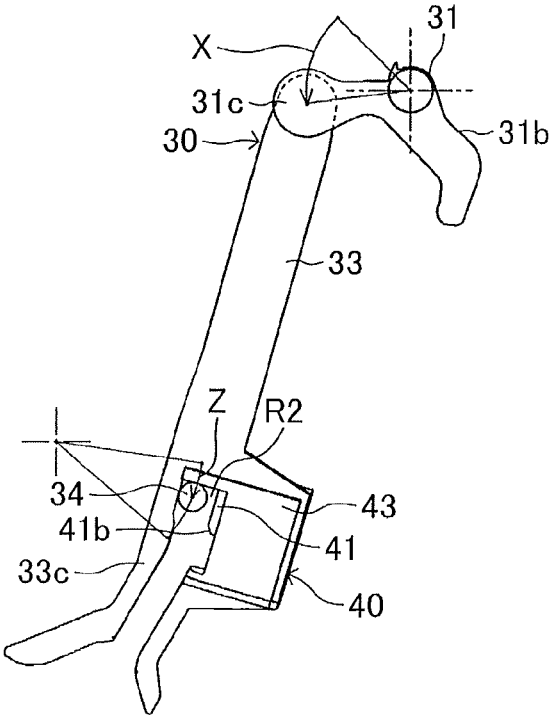
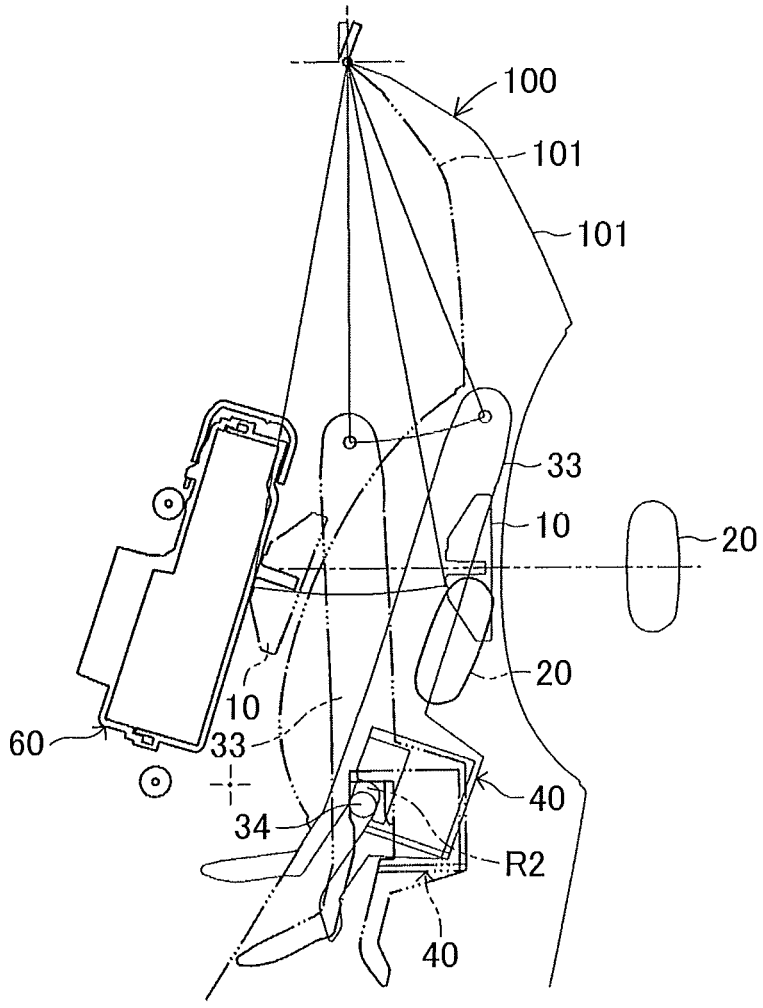

31
X
31c
30
31b
33
Z
R2
34
43
41b
41
33c
40

FIG.9



DOOR OUTER HANDLE APPARATUS FOR VEHICLE

TECHNICAL FIELD

The present invention relates to a door outer handle apparatus for a vehicle, particularly a door outer handle apparatus comprising a base member fixed to a door of the vehicle; an outer handle provided on the base member swingably relative to the base member in an inner and outer direction of the vehicle, the outer handle being movable between a door closed position and a door open position which is in an outer direction of the vehicle to the door closed position; a linkage mechanism capable of transmitting a movement of the outer handle for opening the door, that is a movement of the outer handle from the door closed position to the door open position, to a door latch mechanism as an unlatch operation of the latch mechanism; and a door-opened-prevention mechanism preventing the door from being opened due to inertia force exerted on structural members including the outer handle toward the outer direction of the vehicle at the time of impact of the vehicle.

In a case in which the above-described door-opened-prevention mechanism is not provided with, when an inertia force is exerted on the outer handle toward the outer direction of the vehicle at the time of impact of the vehicle, the movement of the outer handle for opening the door may arises due to this inertia force and therefore the unlatch operation of the door latch mechanism may arises. The unlatch operation of the door latch mechanism is an operation in which a state of the door latch mechanism is changed from a latch state to an unlatch state. In the latch state of the door latch mechanism, it is impossible to open the door that is closed by use of a force in the outer direction of the vehicle. In the unlatch state of the door latch mechanism, it is possible to open the door that is closed by use of the force in the outer direction of the vehicle.

BACKGROUND ART

Such a type of the door outer handle apparatus is disclosed in, for example, the Patent Document 1 described below. In the Patent Document 1, the door-opened-prevention mechanism comprises inertia stopper member (lever member) provided on the base member so as to be rotatable between a set rotational position (initial position) and a lock rotational position which is in the outer direction of the vehicle to the set rotational position; and a biasing member biasing the inertia stopper member toward the set rotational position. In the door outer handle apparatus disclosed in the Patent Document 1, when the inertia stopper member rotates from the set rotational position to the lock rotational position, which is in the outer direction of the vehicle to the set rotational position, against the biasing force of the biasing member in a case where an inertia force (a force toward the outer direction of the vehicle) is exerted on the inertia stopper member at the time of impact of the vehicle, a part of the inertia stopper member moves within a movement locus in a direction for opening the door of a structural member of the linkage mechanism (connection clip provided on a connection rod), and therefore a movement of the linkage mechanism in a direction for opening the door is restricted by the inertia stopper member. With this, at the time of impact of the vehicle, the door-opened-prevention mechanism restricts the movement of the outer handle for opening the door by use of inertia force that works toward the outer direction of the vehicle, so as to prevent the door from being opened.

PRIOR ART DOCUMENT

Patent Document

[Patent Document 1] Japanese Patent Application Laid-Open (kokai) No. 2009-243101

In the door outer handle apparatus for a vehicle disclosed in the above-described Patent Document 1, while the inertia stopper member is kept to be at the set rotational position by use of the biasing force of the biasing member (in normal condition), the inertia stopper member is outside the movement locus in the direction for opening the door of the structural member, and therefore the movement of the linkage mechanism in a direction for opening the door is permitted. Accordingly, in the normal condition, the movement of the outer handle for opening the door is able to be transmitted to the door latch mechanism as the unlatch operation of the latch mechanism through the linkage mechanism, and therefore the door is able to be opened by the movement of the outer handle for opening the door.

SUMMARY OF THE INVENTION

Problems to be Solved by the Invention

In the door outer handle apparatus for a vehicle disclosed in the above-described Patent Document 1, at the time of impact of the vehicle, the door is prevented from being opened with the above-described operations of the door-opened-prevention mechanism. However, at the time of impact of the vehicle, in a case where, the door is deformed so that the base member, the outer handle, and the linkage mechanism or the like move closer in a width direction of the vehicle and downward relative to the door latch mechanism, the movements of the base member, the outer handle, and the linkage mechanism or the like due to the deformation of the door may raise an operation for opening the door in the linkage mechanism and therefore the door may be opened due to a force toward the outer direction of the vehicle.

Means of Solving the Problems, and Action and Effect of the Present Invention

The present invention is to solve the above problems. The present invention comprise: a base member fixed to a door of the vehicle; an outer handle provided on the base member swingably relative to the base member in an inner and outer direction of the vehicle, the outer handle being movable between a door closed position and a door open position which is in an outer direction of the vehicle to the door closed position; a linkage mechanism capable of transmitting a movement of the outer handle for opening the door, that is a movement of the outer handle from the door closed position to the door open position, to a door latch mechanism as an unlatch operation of the latch mechanism; and a door-opened-prevention mechanism not enabling a movement of a transmitting member (a structural member) of the linkage mechanism in a direction for opening the door, in response to the movement of the outer handle for opening the door due to inertia force exerted on the outer handle toward the outer direction of the vehicle at the time of impact of the vehicle, to be transmitted to a transmitted member (another structural member) of the linkage mechanism, so as to prevent the door from being opened. A feature of the present invention lies in

that the door-opened-prevention mechanism comprises: a lever member assembled to the transmitting member above the transmitted member, the lever member being movable between a set position and a fallback position which is in the outer direction of the vehicle to the set position; and a biasing member biasing the lever member toward the set position, wherein when the inertia force is not exerted on the outer handle, the lever member is kept to be in the set position so as to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member, and when the inertia force is exerted on the outer handle, the lever member moves to the fallback position from the set position against the biasing force of the biasing member prior to the movement of the outer handle for opening the door so as not to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member.

According to the above-described door outer handle apparatus of the present invention, in the formal condition (specifically, a condition in which the inertia force is not exerted), the lever member of the door-opened-prevention mechanism is kept to be in the set position so as to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member. Therefore, the movement of the outer handle for opening the door is able to be transmitted to the door latch mechanism as the unlatch operation of the latch mechanism through the linkage mechanism, and therefore the door is able to be opened by the movement of the outer handle for opening the door.

At the time of impact of the vehicle (specifically, a condition in which the inertia force is exerted), the lever member moves to the fallback position from the set position against the biasing force of the biasing member due to the inertia force prior to the movement of the outer handle for opening the door so as not to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member. According to this, at the time of impact of the vehicle, even if the movement of the outer handle for opening the door may arises due to the inertia force, a necessary and sufficient movement of the linkage mechanism is not transmitted to the latch mechanism, and therefore the unlatch operation of the latch mechanism (an operation in which a state of the door latch mechanism is changed from a state in which the door is kept to be closed (latch state) to a state in which the door may be opened (unlatch state)) is prevented from arising.

According to the above-described door outer handle apparatus of the present invention, at the time of impact of the vehicle, the lever member, that is assembled to the transmitting member above the transmitted member, moves to the fallback position from the set position against the biasing force of the biasing member due to the inertia force prior to the movement of the outer handle for opening the door. Therefore, a space for the transmitted member to escape (a space for allowing the transmitting member to move freely downward relative to the transmitted member) is formed above the transmitted member. Accordingly, even in the case where, the door is deformed so that the base member, the outer handle, and the linkage mechanism or the like move closer in a width direction of the vehicle and downward relative to the door latch mechanism, the transmitted member is able to move freely relative to the transmitting member within the space for the transmitted member to escape (is able to remain at an initial position of the transmitted member). Therefore, the movements of the base member, the outer handle, and the linkage mechanism or the like due to the deformation of the door is not capable of raising a necessary and sufficient operation for opening the door in the linkage mechanism and therefore the door is prevented from being opened.

In a practice of the present invention, the transmitting member may be a connection lever extending inside the door in an upper and lower direction of the vehicle, and being tiltable in a width direction of the vehicle, a movement of the connection lever in a lower direction of the vehicle corresponds to the movement of the transmitting member in the direction for opening the door. In this case, the lever member and the biasing member are able to be assembled to the connection lever by use of a case accommodating the lever member and the biasing member. In this case, the lever member and the biasing member may be preliminarily assembled to the case to make them a sub-assembly. Accordingly, an ease for assembling the lever member and the biasing member or the like to the connection lever can be obtained in a good manner.

In a practice of the present invention, the lever member may have a corner portion located at an inner side of the vehicle and at a side close to the transmitted member where a first and a second cutouts are formed, the first cutout forming a space for accommodating the transmitted member in collaboration with the transmitting member and enabling the movement of the transmitting member in the direction for opening the door to be transmitted to the transmitted member in a direction perpendicular to a biasing direction of the biasing member when the lever member is in the set position, and the second cutout preventing the lever member from engaging with the transmitted member when the lever member moves to the fallback position to form a space for the transmitted member to escape. In this case, when the lever member is at the set position, the first cutout is capable of ensuring a desired function of transmitting, and when the lever member moves from the set position to the fallback position, the second cutout is capable of preventing the lever member from engaging (interfering) with the transmitted member to ensure a favorable performance for the transmitted member to escape.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partially perspective view from the outside of a vehicle showing an embodiment of a door for a vehicle including a door outer handle apparatus for a vehicle according to the present invention.

FIG. **2** is a top view showing a set state of main structural members of the door outer handle apparatus for a vehicle shown in FIG. **1**.

FIG. **3** is a perspective view from inside of the door showing the main structural members shown in FIG. **2**.

FIG. **4** is a vertical cross-sectional front view showing the base member, outer handle, and linkage mechanism or the like in the state shown in FIGS. **2** and **3** (in the set state).

FIG. **5** is a perspective view showing the connection lever of the linkage mechanism and the door-opened-prevention mechanism assembled to the connection lever (in a state in which the lever member is in the set position), shown in FIG. **3**.

FIG. **6** is a perspective view showing the connection lever of the linkage mechanism and the door-opened-prevention mechanism assembled to the connection lever (in a state in which the lever member is in the fallback position), shown in FIG. **3**.

FIG. **7** is a schematic view for explaining an operation of the linkage mechanism when the lever member of the door-opened-prevention mechanism is in the set position.

FIG. **8** is a schematic view for explaining an operation of the linkage mechanism when the lever member of the door-opened-prevention mechanism is in the fallback position.

FIG. **9** is a schematic view for explaining an operation in a case where the door is deformed so that the base member, the outer handle, and the linkage mechanism or the like move closer in a width direction of the vehicle and downward relative to the door lock apparatus (including the door latch mechanism).

MODES FOR CARRYING OUT THE INVENTION

An embodiment according to the present invention will next be described with reference to the drawings. FIGS. **1** to **9** show an embodiment of a door for a vehicle provided with a door outer handle apparatus for a vehicle according to the present invention. In this door outer handle apparatus of the embodiment, as shown in FIG. **1**, s base member **10** is fixed to a door **100** assembled to the vehicle at rear and right side. As shown in FIGS. **2** and **3**, an outer handle **20**, a linkage mechanism **30**, and a door-opened-prevention mechanism **40** or the like are assembled to the base member **10**. The base member **10** is fixed to an inside of an outer panel **101** of the door **100** (see FIG. **4**). A cap **50** (a member for retaining the outer handle **20** relative to the base member **10**) is assembled to a rear end portion **11** of the base member **10** so as to sandwich the outer panel **101** between the base member **10** and the cap **50** (see FIGS. **1** and **2**).

The outer handle **20** is a grip-shaped handle provided on the base member **10** in an almost horizontal manner, swingably relative to the base member **10** in an inner and outer direction of the vehicle (a width direction of the vehicle). The outer handle **20** is assembled to the base member **10** in a state in which the outer panel **101** is sandwiched between the base member **10** and the outer handle **20** (in a state in which the outer handle **20** is positioned outside the outer panel **101** and a part of the outer handle **20** penetrates the outer panel **101**). The outer handle **20** is configured to be movable (able to be manipulated) between a door closed position (a position shown by a solid line in FIG. **2**) and a door open position (a position shown by a dashed-two dotted line) which is in an outer direction of the vehicle to the door closed position. The outer handle **20** is assembled swingably to the base member **10** at a front end portion **21** of the outer handle **20** of the vehicle. A rear end portion **22** of the outer handle **20** is movable by a predetermined amount in the outer direction of the vehicle toward the position shown by the dashed-two dotted line from the position shown by the solid line. At the rear end portion **22** of the outer handle **20**, an L-shaped engaging portion **22***a* (see FIGS. **3** and **4**) is formed which engages with a bell crank **31** that is a structural member of the linkage mechanism **30**. Notably, when the outer handle **20** is in the door closed position, upper and lower end portions of the outer handle **20** is engaged (contacted) with the outer panel **101** via a cushion **102**.

The linkage mechanism **30** is configured to be able to transmit a movement of the outer handle **20** for opening the door in an outer direction of the vehicle, that is a movement of the outer handle **20** from the door closed position to the door open position, to a door latch mechanism that is contained in the door lock apparatus **60** shown in FIGS. **1** and **3** by broken lines as an unlatch operation of the latch mechanism (an operation shifting a state of the latch mechanism from a latch state to an unlatch state). The linkage mechanism **30** comprises the above-mentioned bell crank **31**, a coil spring **32** and a connection lever **33**. Notably, the door latch mechanism, that is of a well-known type, comprises a striker fixed to a side of a vehicle body, a latch and a pole assembled to a side of the door **100**, or the like. In the latch state, the pole prohibits the latch engaged with the striker from rotating to prevent the door **100** which is closed from being opened. In the unlatch state, the pole permits the latch engaged with the striker to rotate to allow the door **100** to be opened.

As shown in FIG. **3**, the bell crank **31** is rotatably assembled to the base member **10** at an axial portion **31***a* of the bell crank **31**. The bell crank **31** comprises an input arm portion **31***b* and an output arm portion **31***c*. As shown in FIGS. **3** and **4**, the input arm portion **31***b* extends downward in a radial direction of the axial portion **31***a* and is engaged (contacted) with an outside surface of the vehicle of the engaging portion **22***a* of the outer handle **20** at a tip **31***b***1** of the input arm portion **31***b* (see FIG. **4**). The output arm portion **31***c* extends upward in the radial direction of the axial portion **31***a* and is connected to an upper end portion **33***b* of the connection lever **33** via a connection axis **33***a* integrally mounted to the connection lever **33**. As shown in FIG. **3** by a dashed-two dotted line,

it is possible to provide the output arm portion **31***c* with a counter weight portion (inertia portion) **31***d* extending along the axial portion **31***a*. Notably, the counter weight portion (inertia portion) **31***d* of the output arm portion **31***c* is for restraining the movement of the outer handle **20** for opening the door from occurring due to an inertia force that works toward the outer direction of the door **100** at the time of impact of the vehicle. A restraining force is set based on mass of the counter weight portion (inertia portion) **31***d* and a biasing force of the coil spring **32**.

The coil spring **32** is a return spring (a structural member of a return mechanism which automatically returns the outer handle **20** to the door closed position from the door open position) biasing the bell crank **31** and the outer handle **20** toward a set position (door closed position) shown in FIGS. **2** to **4**. The coil spring **32** is assembled to an outer circumference of the axial portion **31***a* of the bell crank **31**. The coil spring **32** is engaged with the base member **10** at one end thereof and with the bell crank **31** at the other end thereof. The coil spring **32** biases the bell crank **31** in a rotatable direction (counterclockwise direction in FIG. **4**) in which the tip **31***b***1** of the input arm portion **31***b* of the bell crank **31** engages with the engaging portion **22***a* of the outer handle **20**. Owing to this, the tip **31***b***1** of the input arm portion **31***b* of the bell crank **31** is elastically engaged with the engaging portion **22***a* of the outer handle **20**.

The connection lever **33** extends inside the door **100** in the upper and lower direction of the vehicle, and is tiltable in a width direction of the vehicle. The movement of the connection lever **33** in a lower direction of the vehicle corresponds to an operation in a direction for opening the door. As shown in FIG. **3**, the connection lever **33** is connected to the output arm portion **31***c* of the bell crank **31** at an upper end portion **33***b* of the connection lever **33**, and engaged, via the door-opened-prevention mechanism **40**, with the connection pin **34** assembled to an outside open lever **61** (see FIGS. **1** and **3**) that is linked with a pole (not shown in FIGS) of the door latch mechanism at a bifurcated lower end portion **33***c*. This connection lever **33** is configured to move downward by a pre-

determined amount from the set position (initial position) shown in FIGS. **2** and **3** when the outer handle **20** moves from the door closed position to the door open position and the bell crank **31** rotates by a predetermined amount against the biasing force of the coil spring **32**. The door-opened-prevention mechanism **40** is assembled to the lower end portion **33***c* of the connection lever **33**.

In the linkage mechanism **30**, when the door **100** is closed, the outer handle **20** is in the door closed position. When the connection lever **33** is in the initial position, the door latch mechanism is in the latch state. When the outer handle **20** moves from the door closed position to the door open position and the connection lever **33** moves downward by a predetermined amount from the initial position, the door latch mechanism is made to be in the unlatch state. From the foregoing, the rotation of the bell crank **31** against the biasing force of the coil spring **32** and the movement downward of the connection lever **33** correspond to operations in a direction for opening the door.

The door-opened-prevention mechanism **40** does not enable a movement of the connection lever **33** (transmitting member) of the linkage mechanism **30** in a direction for opening the door, in response to the movement of the outer handle **20** for opening the door due to inertia force exerted on a lever member **41** toward the outer direction of the door **100** at the time of impact of the vehicle in a state in which the door **100** is closed, to be transmitted to the connection pin **34** (transmitted member) of the linkage mechanism **30**, so as to prevent the door **100** from being opened. As shown in FIGS. **3**, **5** and **6**, this door-opened-prevention mechanism **40** comprises the lever member **41** assembled to the connection lever **33** by use of a case **43** above the connection pin **34**, and a coil spring **42** assembled between the lever member **41** and the case **43**.

As shown in FIGS. **5** and **6**, the lever member **41** is of an almost rectangular shape, and is assembled in advance in the case **43** along with the coil spring **42** so that the lever member **41** is slidable relative to the case **43** in a width direction of the vehicle. The lever member **41** has a corner portion located at an inner side of the vehicle and at a lower side (a side close to the connection pin **34**) where a first cutout **41***a* and a second cutout **41***b* are formed, and has a recess portion **41***c* for accommodating a spring at an outer side of the vehicle.

The first cutout **41***a* has a longitudinal wall and a lateral wall. When the lever member **41** is in a set position shown in FIGS. **3**, **5**, and **7**, the first cutout **41***a* forms a space R**1** for accommodating the connection pin **34** in collaboration with the lower end portion **33***c* of the connection lever **33**. As shown in FIG. **3**, the first cutout **41***a* also enables the movement of the connection lever **33** in the direction for opening the door (a lower direction in FIG. **3**) to be transmitted to the connection pin **34** in a direction perpendicular to a biasing direction (a inside direction of the vehicle) of the coil spring **42** when the lever member **41** is in the set position.

The second cutout **41***b* is formed by chamfering an inside end portion of the vehicle of the lateral wall of the first cutout **41***a*. The second cutout **41***b* prevents the lever member **41** from engaging (interfering) with the connection pin **34** when the lever member **41** moves from the set position to a fallback position shown in FIGS. **6** and **8** to form a space R**2** for the connection pin **34** to escape in collaboration with the lower end portion **33***c* of the connection lever **33**. The recess portion **41***c* for accommodating a spring is formed in an intermediate portion in an upper and a lower direction of the lever member **41** at an outer side of the vehicle. The recess portion **41***c* is capable of accommodating an inside end portion of the vehicle of the coil spring **42**.

The coil spring **42** is accommodated in the case **43**. The coil spring **42** is engaged with the lever member **41** at one end thereof (an inside end of the vehicle) and is engaged with the case **43** at the other end thereof (an outside end of the vehicle). The coil spring **42** biases the lever member **41** with a predetermined biasing force toward an inside direction of the vehicle (the set position). By virtue of this, when the outer handle **20** moves from the door closed position to the door open position due to the inertia force exerted on the outer handle **20** at the time of impact of the vehicle, the lever member **41** is configured to move to the fallback position from the set position against the biasing force of the coil spring **42** by use of an inertia force exerted on the lever member **41**, prior to the movement of the outer handle for opening the door (the movement from the door closed position to the door open position). The case **43** is made to be a sub-assembly along with the lever member **41** and the coil spring **42** or the like. The case **43** is assembled to the lower end portion **33***c* of the connection lever **33**.

In the embodiment configured according to the above, in normal condition (specifically the inertia force is not exerted toward the outer direction of the door **100** on the outer handle **20** or the like), as shown in FIGS. **3**, **5**, and **7**, the lever member **41** of the door-opened-prevention mechanism **40** is kept to be in the set position so as to enable the necessary and sufficient movement of the connection lever **33** of the linkage mechanism **30** in the direction for opening the door in response to the movement of the outer handle **20** for opening the door to be transmitted to the connection pin **34** via the lever member **41**. With this, a movement of the outer handle **20** for opening the door is transmitted to the door latch mechanism as an unlatch operation of the latch mechanism by the linkage mechanism **30** (specifically as shown in FIG. **7**, an moving distance of the connection lever **33** shown by an arrow X is able to be transmitted to the connection pin **34** as a necessary and sufficient moving distance of the connection pin **34** shown by an arrow Y). Therefore, the movement of the outer handle **20** for opening the door enables the door **100** of the vehicle to be opened.

Incidentally, at the time of impact of the vehicle (specifically in a condition where the inertia force is exerted on the outer handle **20** or the like), the lever member **41** of the door-opened-prevention mechanism **40** moves to the fallback position from the set position by use of an inertia force exerted on the lever member **41** against the biasing force of the coil spring **42** prior to the movement of the outer handle **20** for opening the door (see FIGS. **6** and **8**). The necessary and sufficient movement of the connection lever **33** in the direction for opening the door in response to the movement of the outer handle **20** for opening the door is not able to be transmitted to the connection pin **34** via the lever member **41** (specifically as shown in FIG. **8**, an moving distance of the connection lever **33** shown by an arrow X is able to be transmitted to the connection pin **34** as a moving distance of the connection pin **34** shown by an arrow Z and therefore a difference between the moving distance shown by an arrow Y in FIG. **7** and the moving distance shown by an arrow Z in FIG. **8** cannot be transmitted). Thus, at the time of impact of the vehicle, even if the movement of the outer handle **20** for opening the door occurs due to the inertia force, as shown in FIG. **8**, a necessary and sufficient movement in the direction for opening is not transmitted in the linkage mechanism **30** so as to prevent the door latch mechanism from executing the unlatch operation (an operation for shifting the door latch mechanism from a state in which the door is kept to be closed (the latch state) to a state in which the door can be opened (the unlatch state)). Notably, the moving distance of the connec-

tion pin **34** shown by an arrow Z in FIG. **8** can be made to be zero, by setting the size of the lever member **41** appropriately (e.g. making the lever member **41** appropriately large).

In this embodiment, at the time of impact of the vehicle, the lever member **41** of the door-opened-prevention mechanism **40**, that is assembled to the connection lever **33** above the connection pin **34**, moves to the fallback position from the set position against the biasing force of the coil spring **42** due to the inertia force prior to the movement of the outer handle **20** for opening the door. Therefore, the space R**2** for the connection pin **34** to escape (a space for allowing the connection lever **33** to move freely downward relative to the connection pin **34**) is formed above the connection pin **34**. Accordingly, even in a case where, the door **100** is deformed so that the base member **10**, the outer handle **20**, and the linkage mechanism **30** or the like move closer in a width direction of the vehicle and downward relative to the door lock apparatus **60** including the door latch mechanism (specifically as shown in FIG. **9**, even in a case where the base member **10**, the outer handle **20**, and the linkage mechanism **30** or the like is changed from a state shown in FIG. **9** with a solid line to a state shown in FIG. **9** with a dashed-two dotted line due to a deformation of the outer panel **101** at a portion adjacent to a B pillar of the door **100**), the connection pin **34** is able to move freely relative to the connection lever **33** within the space R**2** for the connection pin **34** to escape (is able to remain at an initial position of the connection pin **34**). Therefore, the movements of the base member **10**, the outer handle **20**, and the linkage mechanism **30** or the like due to the deformation of the door is not capable of raising a necessary and sufficient operation for opening the door in the linkage mechanism **30** and therefore the door **100** is prevented from being opened.

In this embodiment, the lever member **41** and the coil spring **42** of the door-opened-prevention mechanism **40** are assembled to the connection lever **33** by use of the case **43** accommodating the lever member **41** and the coil spring **42**. By virtue of this, the lever member **41** and the coil spring **42** may be preliminarily assembled to the case **43** to make them a sub-assembly. Accordingly, an ease for assembling the lever member **41** and the coil spring **42** or the like to the connection lever **33** can be obtained in a good manner.

In this embodiment, the first cutout **41***a* and the second cutout **41***b* are formed at the corner portion of the lever member **41** located at an inner and lower side of the vehicle. By virtue of this, when the lever member **41** is at the set position (see FIGS. **3**, **5**, and **7**), the first cutout **41***a* is capable of ensuring a desired function of transmitting, and when the lever member **41** moves from the set position to the fallback position (see FIGS. **6** and **8**), the second cutout **41***b* is capable of preventing the lever member **41** from engaging (interfering) with the connection pin **34** to ensure a favorable performance for the connection pin **34** to escape.

In the above-described embodiment, the door outer handle apparatus for a vehicle according to the present invention is applied to the door **100** assembled to the vehicle at a rear and right side. However, the door outer handle apparatus for a vehicle according to the present invention can be also applied to a door assembled to the vehicle at a rear and left side as well as doors assembled to the vehicle at a front and right side and at a front and left side in a same manner or with appropriate modifications. The door outer handle apparatus for a vehicle according to the present invention can be also applied to a door (back door) assembled to the vehicle at a rear end side in a same manner or with appropriate modifications.

The invention claimed is:

1. A door outer handle apparatus for a vehicle, said door outer handle apparatus comprising:

a base member fixed to a door of the vehicle;

an outer handle provided on the base member to swingably move relative to the base member in an inner and outer direction of the vehicle, the outer handle being movable between a door closed position and a door open position which is in an outer direction of the vehicle to the door closed position;

a linkage mechanism capable of transmitting a movement of the outer handle, from the door closed position to the door open position, to a door latch mechanism as an unlatch operation of the latch mechanism to open the door; and

a door-opened-prevention mechanism not enabling a movement of a transmitting member of the linkage mechanism in a direction for opening the door, in response to the movement of the outer handle for opening the door due to inertia force exerted on the outer handle toward the outer direction of the vehicle at the time of impact of the vehicle, to be transmitted to a transmitted member of the linkage mechanism, so as to prevent the door from being opened, wherein

the transmitting member of the linkage mechanism is a connection lever, and

the door-opened-prevention mechanism comprises:

a lever member assembled to the transmitting member above the transmitted member, the lever member being movable between a set position and a fallback position which is in the outer direction of the vehicle to the set position;

a biasing member biasing the lever member toward the set position, wherein when the inertia force is not exerted on the outer handle, the lever member is kept to be in the set position so as to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member, and when the inertia force is exerted on the outer handle, the lever member moves to the fallback position from the set position against the biasing force of the biasing member prior to the movement of the outer handle for opening the door so as not to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member; and

a case connected to the connection lever, the lever member and the biasing member being accommodated in the case.

2. A door outer handle apparatus according to claim **1**, wherein the connection lever is positioned to extend inside the door in an upper and lower direction of the vehicle, and is tiltable in a width direction of the vehicle, a movement of the connection lever in a lower direction of the vehicle corresponds to the movement of the transmitting member in the direction for opening the door.

3. A door outer handle apparatus according to claim **1**, wherein the lever member has a corner portion located at an inner side of the vehicle and at a side close to the transmitted member where a first and a second cutouts are formed, the first cutout forming a space for accommodating the transmitted member in collaboration with the transmitting member and enabling the movement of the transmitting member in the direction for opening the door to be transmitted to the trans-

mitted member in a direction perpendicular to a biasing direction of the biasing member when the lever member is in the set position, and the second cutout preventing the lever member from engaging with the transmitted member when the lever member moves to the fallback position to form a space for the transmitted member to escape in collaboration with the transmitting member.

4. A door outer handle apparatus for a vehicle, said door outer handle apparatus comprising:

a base member fixed to a door of the vehicle;

an outer handle on the base member to swingably move relative to the base member in an inner and outer direction of the vehicle, the outer handle being movable in a first movement in the outer direction of the vehicle from a door closed position to a door open position;

a door latch mechanism configured to latch the door to prevent the door from opening;

a linkage mechanism configured to transmit the first movement of the outer handle to the door latch mechanism as an unlatch operation of the latch mechanism to open the door, the linkage mechanism comprising a transmitting member and a transmitted member;

a door-opened-prevention mechanism not enabling a movement of the transmitting member of the linkage mechanism in a direction for opening the door, in response to the movement of the outer handle for opening the door due to inertia force exerted on the outer handle toward the outer direction of the vehicle at the time of impact of the vehicle, to be transmitted to the transmitted member of the linkage mechanism, so as to prevent the door from being opened, the door-opened-prevention mechanism comprising a lever member and a spring biasing the lever member towards the set position, the spring possessing a central axis;

the lever member being connected to the transmitting member above the transmitted member, the lever member being movable between a set position and a fallback position which is in the outer direction of the vehicle to the set position; and

wherein when the inertia force is not exerted on the outer handle, the lever member is kept in the set position to enable movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member, and when the inertia force is exerted on the outer handle, the lever member axially moves parallel to the central axis of the spring to the fallback position from the set position against the biasing force of the spring prior to the movement of the outer handle for opening the door so as not to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member.

5. The door outer handle apparatus according to claim **4**, wherein the transmitting member is positioned inside the door and extends in an upper and lower direction of the vehicle, and is tiltable in a width direction of the vehicle, such that a movement of the transmitting member in a lower direction of the vehicle corresponds to the direction for opening the door.

6. A door outer handle apparatus according to claim **4**, wherein the lever member has a corner portion located at an inner side of the vehicle and at a side close to the transmitted member where a first cutout and a second cutout are formed, the first cutout forming a space for accommodating the transmitted member in collaboration with the transmitting member and enabling the movement of the transmitting member in the direction for opening the door to be transmitted to the transmitted member in a direction perpendicular to a biasing direction of the spring when the lever member is in the set position, and the second cutout preventing the lever member from engaging with the transmitted member when the lever member moves to the fallback position to form a space for the transmitted member to escape in collaboration with the transmitting member.

7. A door outer handle apparatus according to claim **4**, wherein the lever member has a corner portion located at an inner side of the vehicle and at a side close to the transmitted member where a first cutout and a second cutout are formed, the first cutout forming a space for accommodating the transmitted member in collaboration with the transmitting member and enabling the movement of the transmitting member in the direction for opening the door to be transmitted to the transmitted member in a direction perpendicular to a biasing direction of the compression spring when the lever member is in the set position, and the second cutout preventing the lever member from engaging with the transmitted member when the lever member moves to the fallback position to form a space for the transmitted member to escape in collaboration with the transmitting member.

8. A door outer handle apparatus for a vehicle, said door outer handle apparatus comprising:

a base member fixed to a door of the vehicle;

an outer handle on the base member to swingably move relative to the base member in an inner and outer direction of the vehicle, the outer handle being movable in a first movement in the outer direction of the vehicle from a door closed position to a door open position;

a door latch mechanism configured to latch the door to prevent the door from opening;

a linkage mechanism configured to transmit the first movement of the outer handle to the door latch mechanism as an unlatch operation of the latch mechanism to open the door, the linkage mechanism comprising a transmitting member and a transmitted member;

a door-opened-prevention mechanism not enabling a movement of the transmitting member of the linkage mechanism in a direction for opening the door, in response to the movement of the outer handle for opening the door due to inertia force exerted on the outer handle toward the outer direction of the vehicle at the time of impact of the vehicle, to be transmitted to the transmitted member of the linkage mechanism, so as to prevent the door from being opened, the door-opened-prevention mechanism comprising a lever member and a compression spring configured to apply a biasing force to the lever member to bias the lever member towards the set position;

the lever member being connected to the transmitting member above the transmitted member, the lever member being movable between a set position and a fallback position which is in the outer direction of the vehicle to the set position; and

wherein when the inertia force is not exerted on the outer handle, the lever member is kept in the set position to enable movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member, and when the inertia force is exerted on the outer handle, the lever member moves to the fallback position from the set position against the biasing force of

the compression spring to axially compress the compression spring prior to the movement of the outer handle for opening the door so as not to enable the necessary and sufficient movement of the transmitting member in the direction for opening the door in response to the movement of the outer handle for opening the door to be transmitted to the transmitted member via the lever member.

9. The door outer handle apparatus according to claim **8**, wherein the transmitting member is positioned inside the door and extends in an upper and lower direction of the vehicle, and is tiltable in a width direction of the vehicle, such that a movement of the transmitting member in a lower direction of the vehicle corresponds to the direction for opening the door.

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